CALFED Water Management Strategy

Preliminary

Stage 1 Implementation Framework

December 1999

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Preliminary
Stage 1 Implementation Framework

I. Introduction

The CALFED Bay-Delta Program will complete its Record of Decision (ROD) and Certification by mid-2000. That the ROD and Certification will reflect a 30-year horizon and a broad array of actions to restore the ecological health and improve water management for beneficial uses of the Bay-Delta system. As CALFED has prepared for long-term implementation, it has focused effort on prioritizing actions for Stage 1 -- the first seven years of the Program's implementation. Recent regulatory programs (e.g. ESA listings), water management decisions (e.g. B2 implementation, pending Trinity River flow decision) and increasing water demands have continued the longstanding conflicts between water diversions and fish.

In this context, Governor Gray Davis and Department of the Interior Secretary Bruce Babbitt called on CALFED leaders and stakeholders to create a "framework" for implementing near-term actions that can reduce such resource conflicts in the Delta. Specifically, they called for frameworks for an environmental water account (EWA) and the integrated storage investigation (ISI). As CALFED moved forward on developing the EWA framework, it became clear that – particularly in the near term – enhancing water supply for the environment would draw on the same set of actions including near-term storage, as the agricultural and urban water users need for water supply reliability.

CALFED agencies therefore directed attention toward developing key water supply actions for both ecosystem and water supply reliability needs. CALFED and stakeholders began by identifying a list of water management actions that could be developed during Stage 1A (the first 2-3 years). Computer model runs showed the possible benefits from implementing those actions for ecosystem and/or water supply reliability purposes. The goals of developing this preliminary framework were to:

1) achieve a level of fishery protection that would lead to an assurance to water users, pursuant to the Endangered Species Act, that no additional water would be required for fishery needs; and
2) provide as much additional water supply reliability as reasonably possible. Potential water quality impacts arising from implementing the actions, as modeled in the computer simulations, were also evaluated.

It is clear that the CALFED Stage 1 program needs to accomplish the following results, which depend on a successful water management program:

- progress toward ecosystem restoration in support of achieving recovery of listed species, as measured by increases in species populations and population resilience

- measurable improvements in water quality for drinking water purposes, particularly bromides and total organic carbon

- measurable improvements in water supplies and reliability for urban and agricultural uses

This "framework" in its final form needs to provide a clear direction for how these goals will be accomplished by the end of Stage 1. This draft is designed and intended for discussion with the full CALFED Water Management Development Team on December 8. Comments received during and after that meeting will be considered in redrafting a framework document for consideration by BDAC on December 14, and at the CALFED Policy Group on December 15.

This preliminary framework outlines how CALFED will begin implementing certain key water supply actions immediately after execution of the ROD and Certification. While some CALFED projects may require many years to accomplish, the ecosystem and water users cannot afford to wait 30 years for final implementation. CALFED is expected to achieve some progress on all of its goals during Stage 1. Near-term progress on these water management actions forms one of the cornerstones for CALFED's ultimate success. Section II describes these near-term actions and how they will be developed. Section III outlines the process for using the benefits from the actions.

A. Scope

This preliminary framework has objectives that mirror CALFED's Mission Statement. It seeks to improve – beyond existing regulatory conditions – both ecological health and water management for both the ecosystem and the water supply reliability. Because the most difficult conflicts between the ecosystem and the water users occur in the vicinity of the state and federal export facilities, the Implementation Framework focuses the most attention on actions that will reduce these conflicts. While some of the actions occur upstream from the Delta, all the actions provide some relief from the conflicts arising out of Delta exports.

The actions were chosen so they could be used under a wide range of scenarios. While developing this Implementation Framework, much discussion ensued about the baseline – i.e. the base conditions for water supply for water users and the environment from which proposed additions would be measured. The intense discussion reflected different methods of accounting for the water used for the various pre-implementation purposes. The conflict over baseline reflects a shortage of water for all Delta uses, making immediate implementation of these actions that much more critical. The conflict over the "baseline" indicates the urgency of reducing conflicts over the Delta's water.

One way of reducing such conflicts is to provide an endowment of water and/or funding for fishery needs that allows regulatory agencies that implement the federal and state Endangered Species Acts to provide some assurance that no additional involuntary water reallocation will be required for fishery purposes during Stage 1. This endowment has become known as the "Environmental Water Account" (EWA). This endowment would work in concert with habitat restoration actions contained in CALFED's Ecosystem Restoration Program to place the Delta's threatened and endangered species on a trajectory toward recovery. At the time of the Record of

Decision (ROD) and Certification, the California Department of Fish and Game, the United States Fish and Wildlife Service, and the National Marine Fisheries Service intend to provide such assurances to the state and federal water projects when the Ecosystem Restoration Program and the EWA described in this framework are formally established.

B. Timeline

CALFED agencies will begin implementing water management actions immediately after executing the Record of Decision. Each action has unique qualities that require different initial implementation steps and timeline. Some may provide immediate benefits. Others will require several years before benefits accrue. While the actions have been designed to minimize the need for additional legislative action, some may require additional appropriation or allocation of funds.

When will the final framework be decided? Work will continue on technical studies in early 2000, and additional work will be done with regard to economics and finance.

C. Adaptive Management

CALFED intends to use adaptive management in implementation of the WMS and the EWA. A central tenet of regulatory policies is certainty. Regulations are set in place to accomplish specific actions. Adaptive management, whose central tenet is uncertainty, can pose risk to protected or sensitive species, and habitats, as well as water supply reliability, and water quality. Many challenges go along with using an adaptive approach, most importantly recognizing the many uncertainties that exist.

The most significant element of uncertainty in the CALFED "equation" is the success of the ERP, and other planned programs that will contribute to large-scale ecosystem restoration and rehabilitation. Up to now, regulatory agencies have relied to a large extent on water measures to meet fishery needs - increased flows, decreased diversions, and other facility restrictions. While the water projects had introduced some non-water improvements (e.g., Shasta temperature control device), CALFED brought an entirely new focus: a substantial commitment to restoring ecosystem processes. This began with the creation of the "Category III" program in the 1994 Bay-Delta Accord, which resulted from discussions among Accord negotiators. Subsequently, CALFED, has focused on the restoring ecosystem processes and reducing and eliminating stressors, through the development of wetlands and shallow water habitat, restoration of historical spawning habitat, and other non-water measures (e.g., fish screens and barrier removal), which are hoped to ultimately contribute to increased fishery populations. Many specific ecosystem projects are underway, and the funding for many more has been secured through Proposition 204 and federal appropriations. Both the ERP and CMARP will be guided by adaptive management principles, and both will provide monitoring and assessment elements that will contribute to evaluating the success of restoration actions including those undertaken as part of the EWA.

CALFED is currently evaluating the relative ability of the water management tools to contribute, both individually and in combination, to water supply reliability, and how the different water management tools could be implemented over time. In addition, CALFED has established a process through the Delta Drinking Water Council to assess over time what the next best steps

are to meet drinking water quality objectives. A combination of actions and studies will be developed and performed to drive important decisions on which additional measures or set of measures are most appropriate to meet CALFED's objectives. CMARP will provide data and information on the implementation of actions taken under the water quality program and will include baseline, trend, effectiveness, compliance, and operations monitoring, and it will assess trends, loads, and sources of important water quality constituents. CMARP will provide a feedback loop to help evaluate the relative contribution of all the water management actions to overall system reliability and water quality.

II. Water Management Action Development

CALFED has been using the term "tools" to describe a lengthy list of water management actions, including operational measures, water management coordination efforts, adaptive regulatory approaches, and physical storage and conveyance improvements that may be put into place during Stage 1. Each action has its own benefits and limitations. A detailed description of the potential actions is included in Appendix A of this Framework. The following summary provides the general categories of actions with promising examples of each.

CALFED is evaluating the possible benefits of each of these actions in the modeling or "simulation exercises." Given the limitations of the simulation models and the simplifying assumptions used in the modeling, these simulation exercises offer only general guidance on the desirability of particular actions. In addition, each action carries with it an institutional framework that may limit the action's usefulness or restrict its implementation. For example, CALFED has previously identified the potential benefits of new groundwater storage capacity in both the Sacramento and San Joaquin valleys. Initial simulation exercises have reconfirmed the benefits of groundwater storage in water management operations. Implementation of particular groundwater storage projects, however, raises significant issues of groundwater quality and quantity protection, as well as institutional issues such as ownership, control, and local vs. State regulation. In evaluating potential actions, CALFED has had to make preliminary assessments of implementability.

In developing and implementing actions for an Environmental Water Account and for water supply enhancements, CALFED is mindful of its commitment to continuous improvement in water quality for in-Delta and export purposes. In the simulation exercises, expected effects of action implementation on water quality are being evaluated to identify potential problems and opportunities. CALFED has previously identified a number of operational approaches and specific projects that could improve water quality. One example of an operational approach would be to establish a "Water Quality Account" (of water, money, or both) that could be managed in real-time to improve water quality. Specific projects are also under consideration. In any case, operation of the EWA and other water management actions, in concert with the other CALFED programs, will improve the Delta's water quality.

The following list of potential actions is divided into "Early Stage 1 Actions" (the first two or three years after the ROD and Certification) and "Later Stage 1 Actions" (the remainder of Stage 1). This division reflects CALFED's assessment as to how quickly these particular actions can be implemented. More comprehensive descriptions of these actions including cost

estimates, institutional issues and potential implementation time requirements are included in Appendix A.

A. Early Stage 1 Actions

In the first 2-3 years of Stage 1, CALFED will move forward with aggressive implementation of actions that have been used in the past on a temporary basis. These actions are described below. Other actions in the section dealing with water system improvements have been studied for many years and are already on a schedule for implementation early in Stage 1.

1. Managing the Existing System

In the last two or three years, conflicts over Delta diversions have forced CALFED agencies to turn to new water management approaches to balance environmental and water supply needs. Two actions in particular have offered substantial benefits in certain situations, and CALFED anticipates that these two actions will continue to be useful in the future, and particularly in Early Stage 1.

Joint Point of Diversion. CALFED envisions that maximizing the flexibility of using the "joint point of diversion" will be part of any Stage 1 water management plan. This concept allows the federal water project to use pumping capacity at the State's Banks Pumping Plant, or, conversely, allows the State Water Project to use pumping capacity at the federal Tracy pumping plant. In the past and in the current year, CALFED agencies have requested permission from the State Water Resources Control Board to use Joint Point of Diversion on a single-year basis. CALFED also anticipates that the State Board will make a final decision on ongoing use of Joint Point of Diversion when it issues its water rights decision in the near future.

Although the potential benefits of Joint Point of Diversion are substantial, they are also highly dependent on the particular hydrology of a given year. Further, conditions imposed on Joint Point of Diversion by the State Board or other regulatory agencies to mitigate possible water level, water quality or fishery impacts can also have an effect on the net benefits expected from Joint Point of Diversion.

Source Shifting/Demand Shifting. CALFED water management agencies have also found that voluntary shifts by water users in the timetable for water deliveries during the year, or temporary shifts by water users to non-project sources of supplies, have been extremely valuable in dealing with short term fluctuations in water supply availability. These approaches have been especially useful in addressing the so-called "low point" problem in the San Luis Reservoir (where reduced Delta pumping and increased demands combine to lower reservoir levels to a point where water quality problems occur). Issues associated with these "shifting" management techniques include compensating water users for extra costs incurred by the shift and allocating any increased risk caused by shifting.

2. Creating an Environmental Water Account

Many of the actions being considered for early Stage 1 explicitly address the question of creating an Environmental Water Account. A successful EWA would need to include a source of water supply as well as access to conveyance and storage. Costs and priorities for use would

need to be negotiated on a project-by-project basis. Similarly, the EWA could acquire water and or storage space at existing groundwater storage facilities.

3. Water for EWA and Water Supply Enhancement

Another set of the Early Stage 1 Actions described in Appendix A are those that generate water supplies that could be used for either the EWA or for water supply enhancement. CALFED is aware that it is controversial to describe any actions as "generating water" or "creating new water." In effect, these actions only reallocate water from an existing consumptive or environmental beneficial use. CALFED emphasizes that it will be implementing these actions only to the extent that it can comply with existing laws protecting other water users and environmental values .

CALFED will need to make decisions about how the water supply benefits of these actions are allocated between an EWA and water users. This is discussed below in section III.

Increased Banks Pumping Capacity. Current regulatory agreements limit use of the State's Banks Pumping Plant to 6,680 cfs for much of the year. CALFED is considering increasing the State's pumping to 7,180 cfs between July 1 and September 30. This approach is described more fully in Appendix A. Any increase in pumping would require consultation with the U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), and California Department of Fish and Game (CDFG). In addition, the Corp of Engineers would need to issue a permit under Section 10 of the federal Rivers and Harbors Act.

Flexible Export/Inflow (E/I) Ratio. The 1995 Water Quality Control Plan and related ESA biological opinions all provide for the flexible application of the "E/I ratio" based on real-time evaluation of fishery conditions. Minor temporary adjustments to the E/I Ratio requirements can yield significant water supply benefits without adversely affecting environmental protection. CALFED intends to continue using this action during Stage 1.

Upstream Water Acquisitions. In recent years, CALFED agencies have been able to coordinate upstream water acquisitions to meet environmental goals under the CVPIA Anadromous Fish Restoration Program (AFRP) with pumping plans in the Delta to achieve incidental water supply benefits. Although the purpose of these water acquisitions must continue to be attaining high priority environmental needs identified in the AFRP or CALFED's ERP, CALFED believes that this coordinated approach for generating multiple benefits for water supply and the environment should be continued in Stage 1.

Land Retirement. CALFED has previously identified land retirement as a potential action in addressing water quality degradation due to irrigation drainage. The U.S. Bureau of Reclamation has initiated a land retirement program under the authority of the CVPIA. Although the primary purpose of a land retirement program is to achieve water quality goals, the program has associated water supply reliability benefits. Depending on how the program is structured, those water supply benefits can accrue to the water district containing the retired lands, or could become more generally available for other consumptive or environmental uses.

4. Water System Improvements

Given the longer lead time for construction projects generally, there are only a limited number of water system improvements that could be brought on-line during Early Stage 1. These include:

Integrated Storage Investigation. CALFED anticipates that its integrated storage investigation (ISI) will complete most of its evaluation of the desirability of different groundwater and surface storage facilities during Early Stage 1. The results of the ISI will guide subsequent site-specific evaluation of the most promising sites.

Intertie between State's California Aqueduct and Federal Delta-Mendota Canal. One possible conveyance improvement is an intertie between the two project conveyance canals leading south from the pumps. The principal advantage of an intertie is to allow the federal project to use its entire 4600 cfs pumping capacity during pumping windows.

South Delta Improvements. CALFED has identified the South Delta Improvement Program as a high priority for implementation during Stage 1. The program is designed to improve the reliability of the State's water project while ensuring that water of adequate quantity and quality is available for diversion to beneficial use within the south Delta. Any new facilities associated with the program will not be in place in early Stage 1. The water supply capability of the State's water project will be enhanced during that time by maximizing the amount of pumping through the existing intake gates at the State's Clifton Court Forebay while avoiding scouring south Delta channels and negative impacts to fish, water quality, and local water reliability. This operation will increase the capability above the current level but the maximum capability of Banks Pumping Plant will not be realized due to physical restrictions of the existing intake gates.

B. Late Stage 1 Actions

In the later years of Stage 1, CALFED will continue to implement the Early Stage 1 actions as appropriate. In addition, larger scale projects with longer start-up periods should be coming on line. Simulation exercises suggest that these additional actions could yield substantial benefits for both water supply and environmental protection by the end of Stage 1. The additional actions anticipated for Late Stage 1 are described below.

1. System Improvements

South Delta Improvements. It is anticipated that the new facilities associated with the South Delta Improvements Program will be constructed and operational in the latter part of Stage 1. These facilities will be designed to take advantage of the full pumping capacity of the State's Banks Pumping Plant, 10,300 cfs, and will include a set of new and much larger intake gates to Clifton Court Forebay. To assure water of adequate quantity and quality is available for diversion to beneficial use within the south Delta and contributions are made to restore the ecological health of fish, additional facilities and the corresponding operational rules will also be in place at that time.

New Surface Storage. CALFED has identified a number of potential surface storage projects that could conceivably be brought on line by the end of Stage 1. These include a variety

of configurations for in-Delta storage (Webb Tract, Bacon Island, Woodward Island, and Victoria Island), as well as a small increase (6 feet) in the height of the CVP's Shasta Dam. Substantial technical and institutional work remains to be done before these projects could be constructed and operated. Evaluation of these potential storage projects as well as other potential storage projects that might be implemented beyond Stage 1, are being coordinated under CALFED's Integrated Storage Investigation (ISI) is taking the lead on programmatic evaluation of these projects.

New Groundwater Storage. As noted above, simulation exercises have shown considerable benefits from increased groundwater storage capabilities. In the ISI, CALFED is evaluating several proposed groundwater storage projects throughout the Central Valley. These include southern Sacramento County, East San Joaquin Basin, Kings River Fan and Madera Ranch. In each case, CALFED needs to depend heavily on local partners to address the many local and regional issues associated with groundwater projects.

2. Efficiency Investments

Through its Water Use Efficiency Program, CALFED anticipates significant water supply benefits from investment in water use efficiency measures throughout the State. By coupling efficiency investments with transfer of conserved water, CALFED could apply these water savings to other environmental or water supply uses. Alternatively, the savings could be retained by the water users to contribute to improvement in their water supply reliability.

3. Adaptive Regulatory Responses

Although CALFED is not proposing specific changes to standards in the Clean Water Act or Endangered Species Act regulatory programs, both statutes include provisions for revising regulatory prescriptions in response to new information. During Stage 1, CALFED and the applicable regulatory agencies will evaluate opportunities to revise these regulatory prescriptions to achieve greater flexibility and enhanced environmental protection.

III. Water Manageme. . Actions in Simulation Exercises

Generally, once each action has been implemented, its benefits will be distributed to one or more agencies that will have the right to use those benefits. The recipient(s) of each action will be identified as part of the ROD and Certification. The distribution of the actions reflects the effectiveness of each action in serving either an ecological or water supply reliability purpose. In some circumstances, it is possible that water developed by a particular action could be used for different purposes at different times. In those cases, the ROD and Certification will identify the mechanisms for managing that action.

Clear objectives for operation of the actions will be needed for their implementation. Such objectives have not yet been developed and agreed to. Listed below are the ecological and water supply objectives used in the computer simulation studies to date. The final objectives will be included as part of the ROD and Certification.

A. Objectives For Implementing Actions

Determining how each action satisfied an ecological purpose, and/or a water supply reliability purpose started with establishing objectives for each. (Effects of the simulation on water quality were tracked throughout the simulation, and although specific actions were not implemented to improve water quality or to prevent degradation of water quality an effort was made to avoid impacts to water quality.) The objectives were drawn from the ecological or water supply needs after considering existing regulatory standards. Needs were not quantified, however each need was described based on a number of flow factors: timing, quantity, and quality. The ecological objectives were based on fishery needs, particularly related to export pumping. The water supply needs were based on maximizing south-of-Delta deliveries.

Ecological Objectives. For several fish species of concern, the state and federal fishery agencies identified flow-related actions in the Delta and upstream that will contribute to ERP goals of ecosystem restoration and species recovery. The goal of these actions is increased fish survival through reduced entrainment and flow-related habitat improvement.

Water Supply Objectives. The water supply objective was maximizing export deliveries. Without trying to determine the precise deficit of contract deliveries that export interests suffer, a clear and substantial need for water south of the Delta to improve reliability of those deliveries was identified. The actual amount of water that will be needed in any one year will depend on a number of factors, particularly the cost and the willingness of export interests to pay the costs of the actions.

B. Summary of Simulation Results

CALFED has achieved substantial progress in analyzing the effectiveness of each action in serving an ecological or water supply reliability purpose. CALFED agency staff, working with stakeholder technical representatives, modeled each action applying a variety of assumptions as to existing conditions. Applying the hydrology of several years, the modelers estimated the extent that the fishery objectives could be implemented. The modelers then estimated, after employing each action, the extent of fish entrained at the export pumps, which provided some indication of fishery survival, and the amount of additional water that could be exported south.

IV. Managing the Benefits From Water Management Actions

A. Policies For Distributing Benefits

While CALFED will distribute water management actions and their benefits as part of the Record of Decision, the principles listed below describe how the distribution will generally proceed throughout Stage 1.

- Ecosystem restoration, water supply reliability and water quality will benefit and improve.

- In allocating benefits, it is CALFED's intent to provide the EWA with sufficient assets to allow regulatory agencies to provide assurances that no additional water would be required for fishery needs.
- EWA water will not be used for existing regulatory obligations.
- Generally, if the Department of the Interior 's current implementation plan for Section 3406(b)(2) of the CVPIA prevails in the on-going litigation, the EWA will require fewer assets.
- Because many assets have long development times, both the EWA and water supply reliability will share in the gradual development of benefits during the early years of Stage 1.

Subsequent discussions and possible additional studies will provide guidance for the specific allocation of water management benefits.

B. Operational Decisions

Decisions as to whether benefits from particular actions are used in any particular year for ecological or water supply purposes will be made based on the criteria established in the Record of Decision, including the initial distribution of benefits. For example, benefits distributed to the EWA will be used if the asset will help fulfill: a) fishery objectives; b) restoration of ecological processes in the Delta; c) fishery experimental needs; or d) any other fishery need that research shows will help promote a healthy fishery. Assets distributed to water supply reliability purposes will be used when export interests suffer a deficit in their supplies and they are willing to pay the cost of implementing the action required to receive the benefit. The intended purpose identified in that initial distribution will have first priority for using the asset. If it is not needed, then the action's benefits will be available for the other purpose.

Once an action has been developed, control of its use will be transferred to the agency or agencies that can decide how to use benefits from that particular action. Control of benefits distributed to the EWA decisions will reside with the three fishery agencies – FWS, NMFS and CDFG. Decisions related to use of benefits distributed to water supply reliability will be the responsibility of the Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR). All these decisions will be subject to adjustment based on CALFED's long-term governance arrangement.

C. Finance

Initial implementation of all the actions are expected to be financed by federal and state appropriations, including funding from Proposition 204 and subsequent state bonds. Such funding will allow for preparing the necessary environmental documentation, obtaining the necessary federal and/or state permits and gaining access to potential benefits from certain actions. (Access may be gained, for example, by acquiring an option agreement for purchasing water.) The ultimate beneficiary, however, is assumed to provide the funding for final implementation of the action.

CALFED Water Management Strategy
Stage 1 Implementation Framework

Appendix A

E-021613

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

ASSET DESCRIPTION[1]	EXAMPLES OF HOW ASSETS COULD BE APPLIED
INCREASED BANKS PUMPING CAPACITY	• Increase pumping capacity to 6,680 cfs Nov – March + 1/3 SJR. • Increase pumping capacity to 7,180 cfs Jul-Sep
RIGHT TO BORROW SURPLUS PROJECT CAPACITY	• EWA would borrow San Luis Reservoir capacity
MARKETS (WILLING SELLERS)	• Purchase of water for multiple purposes • Purchase of in-Delta water • Purchase PG&E reoperation water (30,000-100,000 af) • Groundwater Substitution: Shift surface water users in the Sac Valley to groundwater
JOINT POINT OF DIVERSION	• Implement JPOD
FLEXING THE E/I RATIO	• Change the application of the E/I ratio
SOURCE SHIFTING	• Core Peak: Pay user to shift demand to alternative source
GROUNDWATER STORAGE SOUTH OF THE DELTA	• Kern Water Bank • Semitropic • Options: Acquire options on water north and south of the Delta
RIGHT TO BORROW PROJECT STORAGE	• EWA would borrow SWP and CVP water supplies
BORROWING ARRANGEMENTS WITH NON-PROJECT AGENCIES	• Investigate potential for storage capacity access on tributaries on no-harm basis
IN-DELTA AGRICULTURAL DRAINAGE REDUCTION	• Relocate/reroute Delta agricultural drains or hold water for discharge on outgoing tides or for high flow periods to manage salinity, selenium, TDS
INTERTIE DELTA MENDOTA CANAL TO CALIFORNIA AQUEDUCT	• 400 cfs capacity • Need to determine real benefit of intertie when linked to other assets - staging issue
LAND RETIREMENT	• Retire lands which contribute to drainage problem
INTERTIE DELTA MENDOTA CANAL TO CALIFORNIA AQUEDUCT	• 400 cfs capacity • Need to determine real benefit of intertie when linked to other assets - staging issue

[1] A number of the summaries of potential Early Stage 1 Assets have not been completed and/or are being reevaluated for consideration. These assets include: Improved Tracy Fish Facility Fish Screens, ERP, Reservoir Reoperation, Acquisition of Delta Islands, Pumping to Storage, Controlling Algal Growth in Clifton Court Forebay, Blending, and Crop Shifting.

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

INCREASED BANKS PUMPING CAPACITY

Project Description: During August and September of 1999, the State Water Project moved an additional 38,000 AF of State Water Project water from Lake Oroville into San Luis Reservoir by obtaining approval to exceed the allowable export rate. Although the SWP is capable of pumping 10,300 cfs at its Banks Pumping Plant, it is constrained to a lower pumping rate because the inflow to Clifton Court Forebay is constrained to 6,680[2] cfs from mid-March to mid-December by an agreement with the U.S. Army Corps of Engineers. Outside that window, the inflow to Clifton Court Forebay may be increased by an amount equal to one-third of Vernalis flow when it is 1,000 cfs or higher. This summer, the USACE approved an increase of 500 cfs to allow the Clifton Court Forebay inflow to be 7,180 cfs from August 6 to September 30. Next year, a similar proposal is being developed to allow the additional 500 cfs pumping from July 1 through the end of September in the event the added capacity could be used to fill San Luis Reservoir. This asset, increasing the allowable inflow to Clifton Court Forebay, could be expanded beyond water year 2000 to allow for greater operational flexibility and the possibility to capture additional water that is surplus to the Delta. Two specific alternatives are presented below which could be implemented in Early Stage One.

Alternative One -- Increase exports to 6,680 plus "1/3 Vernalis flows from November 1- March 15": As noted above, the SWP is capable of pumping 10,300 cfs at its Banks Pumping Plant. However, it can only utilize the additional export capability, beyond a nominal rate of 6,680 cfs, from mid-December to mid-March. During that window, the amount of additional inflow allowed is one-third of the Vernalis flow when the San Joaquin River flow is 1,000 cfs or higher. This alternative would expand that window by 45 days starting on November 1.

Project Costs: The costs are believed to be minimal at this time.

Timing: Timing necessary to obtain approvals is limited.

Project Benefits: See graph for water supply benefits.

Assumed Duration of Project Benefits: This alternative could probably be functional in about one year and could remain in place in perpetuity. This alternative would be replaced or have its usefulness diminished by other assets that increase the pumping capability of Banks later in Stage 1.

Assumed Operational Restrictions: During wet conditions, spring-run yearlings may be emigrating through the Delta.

Impacts on Others:

[2] This maximum is based on a 3-day running average inflow to Clifton Court Forebay.

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

Permits or Other Approvals Needed: In addition to endangered species consultation with NMFS, FWS, and DFG, a Section 10 Rivers & Harbors Act permit would be needed.

Procedure for Obtaining Permits and Other Approvals: See above.

Implementation Responsibility: DWR.

Necessary Cooperating Parties: NMFS, FWS, DFG, ACOE.

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

INCREASED BANKS PUMPING CAPACITY (CON'T)

Alternative Two -- Increase exports to 7,180 cfs between July1 and September 30: This measure, by itself, does not increase total water supply. However, under specific conditions it may allow the Central Valley Project and SWP to move more water from northern California reservoirs into San Luis Reservoir, leaving additional space in those upstream reservoirs to capture extra winter runoff. Under dry hydrologic conditions, there already exists sufficient capacity at Banks to move SWP water. However, under wet conditions the pumping capacity is fully utilized; increasing Banks pumping in this case may provide additional flexibility.

Project Costs: Initially, capital costs should be minimal. However, some dredging and infrastructure changes may be necessary in future years. DWR staff believes that short-term operational adjustments could be made to avoid potential problems with water levels, but such avoidance measures limit the use of the expanded pumping capability.

Operational costs are likely to be minimal for the SWP. However, there would be costs for using this alternative, in conjunction with joint point of diversion, to move CVP supplies.

Project Benefits: See graph for water supply benefits.

Timing: Timing necessary to obtain approvals is limited.

Assumed Duration of Project Benefits: The next three years. This alternative could be implemented very quickly, within one year. However, it is likely that it would be replaced or have its usefulness diminished by other assets that increase the pumping capability of Banks later in Stage 1.

Assumed Operational Restrictions: Increased pumping during the irrigation season could exacerbate water level conditions in the South Delta. In addition to placing and operating the three temporary rock agricultural barriers, it may be necessary to reduce the pumping during periods of low tide conditions. The USACE will also require consultation with fishery agencies on potential endangered species concerns. Another possible restriction on its use would be during periods of high delta smelt salvage. In 1999, delta smelt salvage continued into the first part of July at high rates.

Impacts on Others:

Permits or Other Approvals Needed: In addition to endangered species consultation with NMFS, FWS, and DFG, a Section 10 Rivers and Harbors Act permit would be needed. It is believed the necessary environmental documentation could be completed prior to the start of Stage 1.

Procedure for Obtaining Permits and Other Approvals: See above.

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

INCREASED BANKS PUMPING CAPACITY (CON'T)

Implementation Responsibility: DWR.

Necessary Cooperating Parties: NMFS, FWS, DFG, ACOE.

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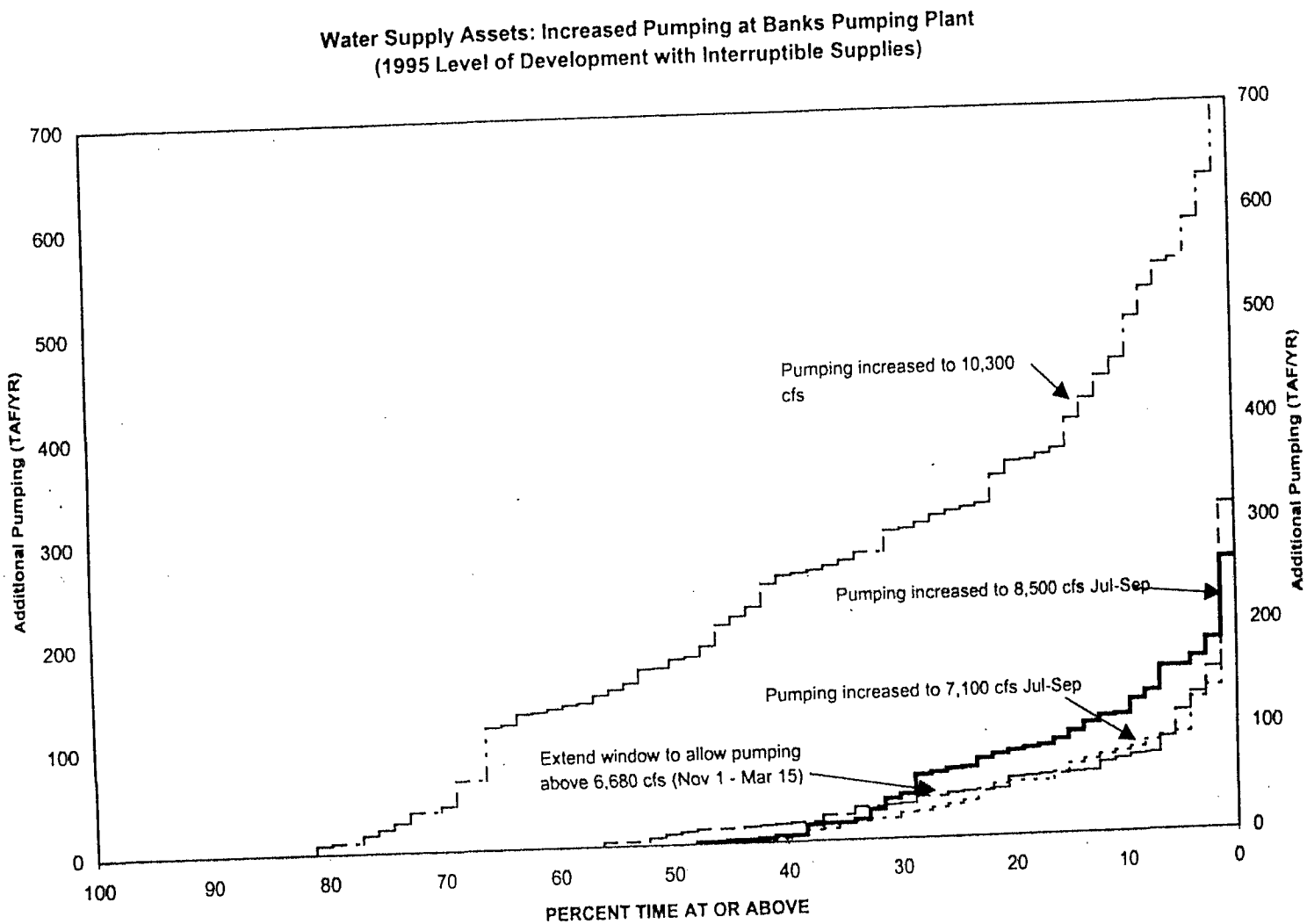
WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION



WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

FLEXING THE E/I RATIO

Project Description: This asset results from modifying the Export/Inflow ratio as described in the Water Quality Control Plan to allow exports over existing E/I standards. EWA water derived from relaxing the E/I ratio would be used to curtail exports at a later date. Water would be pumped if excess pumping capacity is available at the state or federal facilities. Water would be stored in excess storage at San Luis Reservoir or shifted to groundwater if available.

Project Costs: Costs are expected to be negligible.

Timing: The WQCP allows for flexing of the E/I ratio. This would likely occur in the fall/winter months, but may occur into the winter/spring period.

Project Benefits: This measure would allow for increased fishery protection if standards are relaxed during those times when fisheries are not an issue. Export reductions could then occur at times more beneficial to fisheries. Benefits to water supply is expected to be zero. Water quality could be affected if quality of water pumped is different than the pumping foregone.

Assumed Duration of Project Benefits: Immediate. Most benefits to fisheries would occur during a single water year. However, in some instances water could be carried over or banked and used in the following year.

Assumed Operational Restrictions: Relaxation of the E/I ration would be allowed only when increased pumping would not harm fisheries, the Delta ecosystem, or water quality benefits.

Impacts on Others: No net effect to water supply, as pumping is shifted from one time to another.

Permits or Other Approvals Needed: Process is already in place, as described in the WQCP Table 3, footnote 22.

Procedure for Obtaining Permits and Other Approvals: As described in the WQCP Table 3, footnote 22, fishery agencies would recommend variations to E/I limit within the operations group. If there are no objections the action can be implemented immediately. The recommended actions require approval from CALFED Policy Group only if there is disagreement on the action. The SWRCB is notified of any variation; if the Executive Director does not object to the variation within 10 days, the variations will remain in effect.

Implementation Responsibility: U.S. Bureau of Reclamation and California Department of Water Resources

Necessary Cooperating Parties: U.S. Bureau of Reclamation and California Department of Water Resources

E-021620

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

RIGHT TO BORROW SURPLUS PROJECT CAPACITY

Project Description: This is primarily an Environmental Water Account asset. State Water Project and Central Valley Project sharing concepts are already well established through the Coordinated Operations Agreement, existing agreements for the joint use facilities (San Luis Reservoir, San Luis Canal, and O'Neill Forebay, etc.). The tool includes access to unused pumping, conveyance, and storage capacity. At issue are the circumstances under which the EWA might access unused capacity and the relative priority of the EWA relative to others who might also wish to access surplus capacity. For example, what would the priority for use of surplus capacity? These are all issues for negotiation and cannot be determined in advance.

Project Costs: The EWA would, at a minimum, be responsible for increased net operating costs. Additional costs are a subject for negotiation.

Timing: Access could be granted immediately.

Project Benefits: This access is essential if the EWA is to modify Project operations without impact on water users. Therefore, Project benefits include most of the biological benefits of the EWA.

Assumed Duration of Project Benefits: No intrinsic time limitation. However, if Project demand grows, surplus capacity could decline. Also, if regulatory requirements or infrastructure changes, the amount of surplus capacity might increase or decrease.

Assumed Operational Restrictions: Negotiable. The use of surplus capacity must not harm existing users. Also, the need to reserve space for the transfer market could restrict EWA use of surplus capacity.

Impacts on Others: Given the operational restriction above, impacts should be neutral or positive.

[Major] Permits or Other Approvals Needed:

Procedure for Obtaining Permits and Other Approvals: No permits should be needed for use of the capacity.

Implementation Responsibility: The Department of Water Resources and U.S. Bureau of Reclamation, and whatever institution or institutions operate the EWA.

Necessary Cooperating Parties: The DWR and Reclamation, and whatever institution or institutions operate the EWA.

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

SOURCE SHIFTING

Description: Single or multi-year agreements with selected south-of-the-Delta water users to shift to non-CVP/SWP supplies during environmentally sensitive periods (and shift back to CVP/SWP supplies during less sensitive times) could be useful toward adding to the overall flexibility of the SWP/CVP system. For example, in years when CVP delivery allocations are limited due to the San Luis Reservoir low-point condition (mid August), arrangements by other South-of-Delta users to shift demands from pre low-point to post low-point could facilitate higher CVP deliveries or additional fish protection actions.

This asset is primarily intended to enhance real-time management of the system with substantially less conflict. Rescheduling 50-100 TAF/year for operational flexibility is probably feasible in a given year, depending on hydrology and perceived risk. Demand shift agreements can be for single or multiple years. Multiple year arrangements offer more flexibility to the CVP/SWP system but involve more costs and risks for the contractor who must shift to local resources for a longer period of time. By extending the time period for pay back (even one winter), it is much more likely that pay back can occur during "surplus" conditions and therefore not trigger the need for additional tools. The exception to this is when the subsequent year is very dry (no occurrence of surplus water). In this case, another tool would be needed to ensure pay back.

Project Costs: Demand Shift arrangements that are paid back within the same year will vary in cost depending on hydrology, carryover storage and risk perceived by the contracting agency. It is reasonable to assume that south-of-Delta arrangements on the order of $25 - $75/AF could be secured during Stage 1. Multiple-year arrangements would be more expensive.

Timing: Short-term demand-shift arrangements could be secured quickly (on the order of a couple of months)
Longer-term arrangements are more complicated, and would therefore take longer to secure.

Project Benefits: Shifting selected demands from pre low-point to post low-point can help maintain water deliveries to some contractors while allowing additional fish protection actions. The degree of benefits would depend on the magnitude of the shift and timing of the pay-back water.

Assumed Duration of Project Benefits: It is likely that demand-shift arrangements would be available on a year-by-year basis throughout Stage 1 in years when unusual circumstances (i.e. drought) do not exist.

Assumed Operational Restrictions: The key restriction would be the timing of the payback water. The shorter the payback period, the less flexibility afforded. Also, it is likely that substantial penalties would be incurred if payback were not achieved on schedule.

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

SOURCE SHIFTING (CON'T)

Impacts on Others: Demand Shift arrangements would need to be crafted to ensure no injury to others during the payback period. For example, payback water should not compete with (or reduce) other project contractual obligations, such as entitlement or interruptible water deliveries. Guarantees are needed to assure that subsequent SWP or CVP delivery allocations are not negatively impacted. In addition, payback should be complete during times of higher water quality and lower environmental sensitivity.

Permits or Other Approvals Needed: Since Demand Shifts are completely within existing SWP and CVP contracting authorities and permits, it should be possible to implement these arrangements with approval of USBR and DWR.

Procedure for Obtaining Permits and Other Approvals: Negotiated agreements with USBR, DWR, and the contracting entity.

Implementation Responsibility: USBR, DWR and the contracting entity.

Necessary Cooperating Parties: Contracting entity.

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

RIGHT TO BORROW SURPLUS PROJECT STORAGE

Project Description: The EWA would have the right to borrow stored Project water on a "no harm" basis. The Projects would have the right to borrow stored EWA water on a "no harm" basis. For example, the EWA might cause San Luis Reservoir storage levels to drop as a result of export reduction in the spring to protect fish. That is, the EWA might borrow water in San Luis Reservoir. The EWA would then be obligated to pay back the borrowed water before the shortfall caused any losses for water users. Payback might be required as soon as the following August, should San Luis have a low point problem. In other years, payback might be delayed through the next winter. Should San Luis Reservoir fill during the next winter, the debt would be erased. Similarly, the Projects might borrow EWA water in storage. For example, if EWA has water in San Luis Reservoir during the summer, the Projects would be able to borrow this water in order to make greater deliveries without running into a low point problem. The borrowed water would need to be paid back whenever the EWA next needed to cut exports. The concept of "no harm" implies that the EWA and the Projects must have sufficient collateral in order to pay off the loan before harm occurs. The Projects do not have a collateral problem, since they may pay back the EWA simply by reducing export pumping. The EWA collateral problem is significant, however. Groundwater storage, agreements for supply shifting with MWD, Kern, and Santa Clara, efficiency purchases, etc. all represent assets that might allow the EWA to take on debt.

Project Costs: Whoever borrows water in storage would be responsible, at a minimum, for any increase in net operating costs. Additional costs are a subject for negotiation. Loans not paid off in a timely way might be subject to penalty charges.

Timing: Access could be granted immediately.

Project Benefits: This access is essential if the EWA is to modify Project operations. Therefore, project benefits include most of the biological benefits of the EWA.

Assumed Duration of Project Benefits: No intrinsic time limitation. However, if Project demand grows, then less water might become available for borrowing. If regulatory requirements change, the ability to borrow water might increase or decrease. Also, with new infrastructure, EWA ability to borrow and repay water should improve. For example, if Banks pumping capacity were shifted to 10.3 kcfs, then the EWA could repay debts in San Luis with upstream water more easily, and would more frequently have its debts in San Luis erased over the following winter.

Assumed Operational Restrictions: Negotiable. Water debts must not harm existing users. This limits the amount of water that can be borrowed and forces the EWA to operate so as to repay the loan in a timely fashion.

Impacts on Others: Given the operational restriction above, impacts should be neutral. However, water debt will inevitably increase the risk that water users will receive less water than expected. This outcome must be made unlikely and damages paid should harm be inflicted.

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

RIGHT TO BORROW SURPLUS PROJECT STORAGE (CON'T)

[Major] Permits or Other Approvals Needed: No permits should be needed for use of project storage.

Procedure for Obtaining Permits and Other Approvals: See above.

Implementation Responsibility: The Department of Water Resources and U.S. Bureau of Reclamation, and whatever institution or institutions operate the EWA.

Necessary Cooperating Parties: State and federal contractors will, presumably, need to be comfortable with borrowing criteria.

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

BORROWING ARRANGEMENTS W/ NON-PROJECT AGENCIES

Project Description: This is primarily an EWA tool. Most interactions between the EWA and non-Project agencies will be through markets. Indeed, capacity borrowing is really just another kind of market interaction. However, it is different enough from standard arrangements for water purchases that it is worth discussing. The most obvious kind of capacity worth borrowing is storage capacity. Local projects frequently have empty space in surface or groundwater storage. This capacity could provide benefits to the EWA without any impact on the local project. The problem is in backing water up into these reservoirs. It can be done sometimes, however. For example, if the EWA released water from Mendota Pool during the VAMP period, this would allow other San Joaquin Tributary agencies to reduce their releases, thus increasing storage upstream on the Tuolumne or Merced Rivers. The local agencies might be willing to give the EWA control over this water (provided that they continued to receive payment for the water). The water could then be released on a schedule dictated by the EWA. Similarly, after the SWRCB enforces its WQCP through a water rights order, it may be possible to back water into other local reservoirs by agreeing to assume some downstream obligation on a temporary basis. Of course, it is always possible to acquire water in upstream storage through direction purchase.

Project Costs: The EWA would be responsible, at a minimum, for any increase in net operating costs. Additional costs are a subject for negotiation.

Timing: Agreements would need to be negotiated with local agencies in control of upstream storage.

Project Benefits: This tool would enhance the ability of the EWA to store water and, even more important, to generate instream flows on non-Project tributaries.

Assumed Duration of Project Benefits: No intrinsic time limitation.

Assumed Operational Restrictions: Presumably, EWA water in local reservoirs would be the first water to spill, once flood control levels were reached.

Impacts on Others: Given the operational restriction above, impacts should be neutral or positive, since the EWA would generally increase local storage levels.

[Major] Permits or Other Approvals Needed:

Procedure for Obtaining Permits and Other Approvals: In general, the operational changes are already within the discretion of participating local agencies.

Implementation Responsibility: Whatever institution or institutions operate the EWA.

Necessary Cooperating Parties: Local water agencies.

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

IN-DELTA AGRICULTURAL DRAINAGE REDUCTION
(Time Drainage Discharge to Outgoing Tides)

Project Description: Limit drainage discharge from in-Delta islands to only the part of the tide cycle that would result in the smallest volume reaching municipal intakes. This phase in the tide cycle could be different from one island to the other, and vary between different discharge locations on the same island. Quantitative assessments for this approach have not been done in any detail. However, existing drainage ditches on Delta islands might have enough capacity to withhold discharge for 12 or more hours. Assuming (1) an average discharge as high as 5 cubic-foot-per-second (cfs) and (2) only one mile of drainage ditch 20 feet wide for every 1,000 acres of irrigated field, the water level in the drainage ditch would rise only 2 feet over 12 hours.

Project Costs: Three cost components are identified:

- *Additional pump capacity and automation equipment at each pump facility to control drainage discharge to the appropriate part of the tide cycle* A rough cost estimate for equipment if additional pumps are required would be twenty million dollars, assuming an installation cost of $200,000 for a 20 cfs (a 75 horse-power pump) for an additional capacity of 2,000 cfs Delta-wide. The cost for automation equipment is probably small. Even for an equipment and installation cost of $1,000 for each one of the 600 discharge pumps in the delta, the total cost would be under a million dollars.
- *Additional power cost for those pumping shifted to peak rate hours* This additional energy cost is hard to predict due to the deregulation of the electric power market in the next three to four years. At current capacity and usage charges in PG&E peak and off peak rates for summer months (April 15 to October 15), a shift of 1,000 cfs from off-peak to peak rate pumping would cost an additional $315,000 per year. A pump-lift of 20 feet and a pump efficiency of 50% are assumed.
- Any dredging of existing drainage ditches to increase holding capacity (limited because of the slip circle, among other considerations) and/or creation of holding ponds. The possibility of creating wetlands to be used as holding/storage ponds requires further investigation.

Timing: One to four years

Project Benefits: The potential reduction in in-Delta drainage reaching urban intakes and the improvement in water quality have not been quantified.

Assumed Duration of Project Benefits: Duration of project.

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

IN-DELTA AGRICULTURAL DRAINAGE REDUCTION
(Time Drainage Discharge to Outgoing Tides – Con't)

Assumed Operational Restrictions: This approach will not reduce impacts of in-Delta drainage at urban intakes during wet weather events unless accompanied by significant storage facilities. This is due to the much larger volume of runoffs involved – most islands have to pump continuously to avoid or reduce flooding during rain events. The operational flexibility during irrigation season varies from island to island. Storage capacity on individual islands could vary substantially, and some islands may not have sufficient flexibility to with-hold discharge over a significant portion of a tide cycle.

Impacts: Impacts on agricultural operations could be minimized if automation equipment could be set up and existing drainage conveyance facilities have enough capacity for the discharge over a few hours.

Major Permits or Other Approvals Needed: Cooperation of local land-owners is critical.

Implementation Responsibility: DWR

Necessary Cooperating Parties: Cooperation of local land owners is critical.

Other considerations: A study to quantify and optimize project parameters and benefits should be carefully done as the next step if the approach is to be considered further. This study should be performed using Delta flow and transport models (FDM or DSM2) and MWQI (the Municipal Water Quality Investigation Program of DWR) data on drainage water quality. A survey of the drainage conveyance and pumping facilities in Delta islands, especially those in Central and South Delta, is necessary before this study proceeds.

APPENDIX. *Parameters used in power cost estimates*

PG&E charges
Capacity: $3.70/kW/month off peak, $13.35/kW/month peak
Usage: $57.70/MW-hr off peak, $87.10/MW-hr peak
Peak hours are noon to 6 pm, April 15 to October 15. Off-peak hours at all other times.

Conversions
7.48 gallons per cubic foot
3.785 litres per gallon
1 kg per litre water
1 W = 1 Joule/second = 1 Newton-meter/second = 1 kg m^2/s^3

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

CVPIA LAND RETIREMENT PROGRAM
(5 Year Demonstration Project)

Project Description: CVPIA, Section 3408(h) authorizes Interior to purchase land from willing sellers which would, if permanently retired from irrigation, reduce drainage, enhance fish and wildlife resources, and make water available for CVPIA purposes. The Land Retirement Program (LRP) may assist with the recovery of threatened and endangered species in the San Joaquin Valley and will be a positive move towards resolving water quality issues of the San Joaquin River by reducing drainage-related problems. Interior is pursuing a 5-year Demonstration Project to study the impacts of retiring 15,000 acres on groundwater levels, groundwater and surface water quality, soil chemistry and biota. Water acquired will be used for the environmental purpose of rehabilitation of upland habitat on the demonstration lands. Alternative water uses would need to be evaluated after the five year demonstration project.

Issues: A variety of issues have been identified through scoping and ongoing discussions with water districts, growers, environmental organizations, state and federal agency representatives. These issues include: physical impacts of land retirement; potential to rehabilitate lands to upland habitat; risk of wildlife exposure to contaminants; disposition of water, socio-economic impacts; air quality; and post-retirement land use (adaptive management)

Project Costs: Capital costs will include the acquisition of retired land over the next 10 to 15 years. This could be as high as $25 million dollars for acquisition costs. Habitat restoration costs at this time are unknown.

Timing: Additional NEPA will be required to implement a larger land retirement program up to 90,000 acres. This will take several years after the 5 year demonstration project is completed.

Project Benefits: The benefits of the project is to reduce drainage, enhance fish and wildlife resources, and make water available for CVPIA purposes.

Assumed Duration of Project Benefits: Land Retirement may or may not provide permanent benefits. Water allocations within a district from retired lands will be variable from year to year due to drought or other factors. Also, the water associated with retired lands could be transferred to a district=s supplemental supply and used on non-drainage problem lands. During the 5 year demonstration project, acquired water will be used on-site for habitat rehabilitation efforts, or if in excess of Interior=s needs on-site, water may be transferred to another user within the District for CVPIA purposes to be used on non-drainage problem lands, or may be transferred out of the district for CVPIA purposes, primarily to enhance fish and wildlife resources.

Assumed Operational Restrictions: It is not know if the government has the authority to sell water allocations from retired lands. It may be able to exchange these allocations with the district or other districts.

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

CVPIA LAND RETIREMENT PROGRAM
(5 Year Demonstration Project)

Impacts on Others: The lands proposed for acquisition are underlain by perched water tables, which are highly saline and contain high concentrations of selenium, a naturally-occurring trace element which has been shown to be toxic to many species of wildlife. The water acquired for this Demonstration Project will be used for environmental purposes of rehabilitating project lands to upland wildlife habitat and will be applied in such a manner so it will not contribute to deep percolation to the shallow groundwater underlying the project lands. Water acquired in excess of Interior's projected need to rehabilitate the retired lands may be sold to eligible landowners within the districts on an annual basis to be applied for irrigation purposes on non-drainage impacted lands, or may be transferred to other CVPIA purposes. Additional environmental analysis on the specifics of any proposed transfers will be completed prior to the occurrence of any transfer of water to ensure compliance with the National Environmental Policy Act and the Endangered Species Act as well as other legal requirements. There will be no impact on CVP water supplies, as the proposed action does not affect CVP operations or availability of water supplies.

Permits or Other Approvals Needed: NEPA and/or CEQA requirements would be required to transfer or sell water allocations from retired lands under Section 3408(h). ESA requirement would need to be addressed if changes in land use were to take place.

Procedure for Obtaining Permits and Other Approvals: Estimated time required to obtained all approvals could be as little as 90 days to as much as a year depending on amount of water being transferred and location of transferred water from retired lands.

Implementation Responsibility: The responsibility for implementing the disposition of water from retired lands falls under the managing agency or operator of the property. Management of annual water allocations from the local water district would be the responsibility of the managing agency.

Necessary Cooperating Parties: Cooperation with FWS under ESA requirements for the transfer of project water from retired lands outside a water district will be critical. This action would fall under the CVPIA Water Transfer Guidelines. Cooperation with the local Board of Supervisors would be required if water is transferred outside the county jurisdiction.

WATER MANAGEMENT ASSETS
FOR EARLY STAGE ONE IMPLEMENTATION

INTERTIE DMC TO CALIFORNIA AQUEDUCT

Project Description: 400 cfs intertie (designed for 600 cfs for redundancy) between the DMC and the California Aqueduct. Allows Tracy P.P. to pump at full capacity (4600 cfs) during months when normal operations limit capacity to 4200 cfs.

Project Costs: $10 million estimated capital costs. $1.5 million estimated annual O&M costs. _____$/AF

Timing: Environmental documentation: 1 year. Water Rights: fits within existing USBR rights. Construction: 1 year

Project Benefits: 125 TAF maximum increased pumping per year. (400 cfs/day for 5 months, November-March). Yield of project estimated at _____AF in dry period, and ____AF for 71 year average.

Assumed Duration of Project Benefits: If unlimited JPOD is granted, the water supply benefits of intertie would be decreased when the SWP is not using all of its capacity (this is also true when the CVP is pumping less at Tracy than it can convey through the Delta Mendota Canal). However, when the SWP is pumping at its maximum allowable rate, even if that rate is at the rated capacity of Banks Pumping Plant, the intertie will provide a benefit when the CVP is pumping at the rate that may be conveyed through the DMC. Facilities are designed for about a 10 year life.

Assumed Operational Restrictions: Operate intertie in the months of November-March to existing Delta criteria, including take provisions of current Biological Opinions. Others?

Impacts on Others: Potential of about 400 cfs higher exports from Delta in months of November-March.

[Major] Permits or Other Approvals Needed: Assumed to fit within existing USBR water rights permit. NMFS, F&G, USFWS consultation on endangered species? 404 permit?

Procedure for Obtaining Permits and Other Approvals: USCOE issues 404 permit. NMFS, F&G, USFWS issues Biological Opinions.

Implementation Responsibility: USBR

Necessary Cooperating Parties: DWR for operations. Fishery agencies to monitor implementation of Biological Opinions.

WATER MANAGEMENT ASSETS FOR LATE STAGE ONE IMPLEMENTATION

INCREASED BANKS PUMPING CAPACITY

Project Description: During August and September of 1999, the State Water Project moved an additional 38,000 AF of SWP water from Lake Oroville into San Luis Reservoir by obtaining approval to exceed the allowable export rate. Although the SWP is capable of pumping 10,300 cfs at its Banks Pumping Plant, it is constrained to a lower pumping rate because the inflow to Clifton Court Forebay is constrained to 6,680[2] cfs from mid-March to mid-December by an agreement with the U.S. Army Corps of Engineers. Outside that window, the inflow to Clifton Court Forebay may be increased by an amount equal to one-third of Vernalis flow when it is 1,000 cfs or higher. This summer, the USACE approved an increase of 500 cfs to allow the Clifton Court Forebay inflow to be 7,180 cfs from August 6 to September 30. Next year, a similar proposal is being developed to allow the additional 500 cfs pumping from July 1 through the end of September in the event the added capacity could be used to fill San Luis Reservoir. This asset, increasing the allowable inflow to Clifton Court Forebay, could be expanded beyond water year 2000 to allow for greater operational flexibility and the possibility to capture additional water that is surplus to the Delta. Two specific alternatives are presented below which could be implemented in Late Stage One.

Alternative One -- Increase SWP exports to 8,500 cfs between July1 and September 30: This alternative increases the allowable inflow to Clifton Court Forebay to 8,500 cfs.

Project Costs: About $500,000 of capital improvements in the South Delta will be needed to mitigate for the effects of higher pumping on a long-term basis. The capital improvements are being developed by DWR in coordination with the CALFED Bay/Delta Program. Generally, those improvements include dredging at specific locations in the South Delta (about $300,000) and improving the efficiency of specific diversions that are downstream of the temporary barrier sites.

Project Benefits: See graph for water supply benefits.

Timing: See above.

Assumed Duration of Project Benefits: In perpetuity. This alternative would probably be functional mid-Stage 1.

Assumed Operational Restrictions: Increased pumping during the irrigation season could exacerbate water level conditions in the South Delta. In addition to placing and operating the three temporary rock agricultural barriers, it may be necessary to improve diversion capability for those water users located downstream of the barriers. The USACE will also require consultation with fishery agencies on potential endangered species concerns. Another possible restriction on its use would be during periods of high

[2] This maximum is based on a 3-day running average inflow to Clifton Court Forebay.

E-021632

WATER MANAGEMENT ASSETS
FOR LATE STAGE ONE IMPLEMENTATION

INCREASED BANKS PUMPING CAPACITY (CON'T)

delta smelt salvage. In 1999, delta smelt salvage continued into the first part of July at high rates.

Permits or Other Approvals Needed: In addition to endangered species consultation with NMFS, FWS, and DFG, a Section 10 Rivers and Harbors Act permit would be needed. It is believed the necessary environmental documentation and mitigation could be completed mid-Stage 1.

Implementation Responsibility: DWR.

Alternative Two -- South Delta Improvement Project Exports up to 10,300 cfs

Project Costs: About $590 million are needed for a new Clifton Court Forebay screened fish facility and intake structure and associated dredging on Old River. Another $40 million would be needed to resolve SDWA water supply/quality problems (barriers, dredging, extending agricultural diversions, etc.). Mitigation costs for the project have yet to be determined.

Project Benefits: See graph for water supply benefits.

Assumed Duration of Project Benefits: This is action could provide benefits in perpetuity.

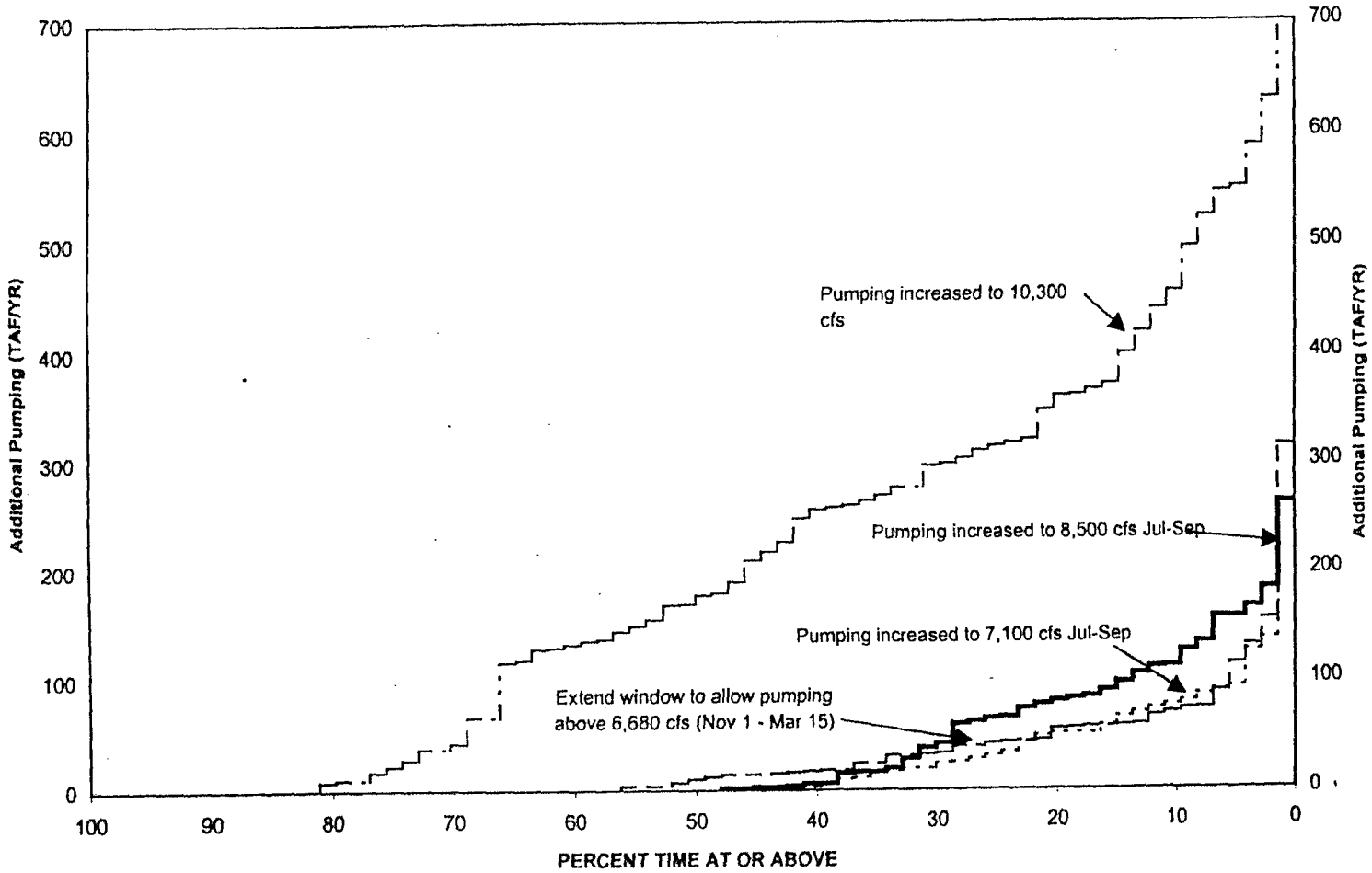
Assumed Operational Restrictions: Operational rules are to be determined. Rules will be needed to protect fisheries, as well as local diverters. Potential show stoppers are to be determined.

Permits or Other Approvals Needed: In addition to endangered species consultation with NMFS, FWS, and DFG, a Section 10 Rivers and Harbors Act permit, CWA Section 404 and 401 permits, and FEIR/EIS would be needed.

Implementation Responsibility: DWR.

WATER MANAGEMENT ASSETS
FOR LATE STAGE ONE IMPLEMENTATION

Water Supply Assets: Increased Pumping at Banks Pumping Plant
(1995 Level of Development with Interruptible Supplies)



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WATER MANAGEMENT ASSETS
FOR LATE STAGE ONE IMPLEMENTATION

EFFICIENCY INVESTMENTS

Project Description: A number of possible variations exist. Use CALFED investments in urban/agricultural water efficiency to help meet CALFED goals. For example:

- Credit water saved toward water supply targets.
- Transfer some water saved to areas of particular need
- Transfer some of saved water for blending to improve water quality (where water saved has higher water quality than other water for which it can be exchanged).
- Transfer some water saved to the EWA.

Applicable practices include:

- Urban coastal water conservation. For example, CALFED could help fund an acceleration in the replacement of ultra low flush toilets (ULFTs).
- Urban coastal water recycling
- Urban and agricultural reductions in ET and/or discharges to salt sinks.

All versions involving transfer of water must be attractive from a local perspective. For urban agencies, this implies that the water accessible to CALFED will be water of limited value to local areas. There are two related forms of such water: (1) wet year water and (2) temporary water (e.g., available for a period of years only). Both wet year water and temporary water may be very valuable to CALFED for Stage 1.

Several urban agencies were approached to ascertain the level of interest in exploring the potential for this tool. The agencies seem willing to discuss possible CALFED investments in efficiency. However, they are very cautious about making any kind of commitment, however, tentative, to such a tool at this time. Therefore, the use of efficiency investments as a tool to provide CALFED benefits must remain speculative at this time.

Project Costs/ Project Benefits: CALFED has budgeted on the order of $1 billion for efficiency purchases during Stage 1. If the cost of water saved is $500/af, then CALFED could generate 2 million acre-feet of savings. Of course not all the savings would be realized within Stage 1. Alternatively, if $1 billion is converted into any annual income stream of $100 million, then CALFED could generate an average of 200 kaf per year through efficiency. If the water saved were focussed on just a fraction of years (e.g., wetter than average years), then the amount of water possible could be quite large in these years. Temporary water would be quite valuable to CALFED inasmuch as many efficiency measures can be put in place in a very short time, and CALFED is more in need of new benefits in the near-term than the long-term. Wet year benefits would be particularly beneficial to the EWA, for which large needs have been identified in wet years. Also, federal export contractors will continue to have unmet needs in many wet years.

WATER MANAGEMENT ASSETS
FOR LATE STAGE ONE IMPLEMENTATION

EFFICIENCY INVESTMENTS (CON'T)

Timing: Aggressive low tech projects such as ULFT replacement could begin within 1-2 years, as demonstrated by Los Angeles Department of Water and Power (LADWP). Water recycling projects could take much of Stage 1 to implement.

Project Benefits: (See above)

Assumed Duration of Project Benefits: Efficiency measures, such as ULFTs, which produce less water over time would have an effective lifetime of less than 20 years. By contrast, water recycling projects might be operated and provide benefits indefinitely. In such cases, the duration of project benefits would be determined by the contract terms.

Assumed Operational Restrictions: No intrinsic restrictions.

Impacts on Others: By structuring CALFED efficiency investments as transfers instead of grants, CALFED will change the benefit stream from efficiency. For example, efficiency improvements by urban coastal Project contractors would normally increase supplies for agricultural Project contractors, as a result of Project rules. Treated as transfers, this water would, instead, flow to the beneficiary selected by CALFED.

[Major] Permits or Other Approvals Needed:

Procedure for Obtaining Permits and Other Approvals: Local approval is needed in all cases. For water recycling projects, the approval process can be very extensive.

Implementation Responsibility: Probably local implementation.

Necessary Cooperating Parties: Local Agencies. For projects involving the transfer of water, SWP and CVP cooperation might be needed. For state and federal contractors, the cooperation of other contractors might be needed.

WATER MANAGEMENT ASSETS
FOR LATE STAGE ONE IMPLEMENTATION

GROUNDWATER STORAGE SOUTH OF THE DELTA

Project Description: This asset will provide additional storage to allow greater flexibility to the system and increased water supply reliability. Groundwater banking is a form of conjunctive use that involves the storage of surplus or wet-year water in groundwater basins that have existing storage space. Currently, a number of basins both north and south of the delta have available storage for groundwater banking.

The following groundwater banking projects have been identified as the most promising potential Late Stage 1 Assets:

	Project Area	Minimum Storage (acre-feet)	Potential Storage (acre-feet)
1)	South Sacramento County	500,000	1,000,000
2)	Eastern San Joaquin Basin	500,000	2,000,000
3)	Madera Ranch	300,000	500,000
4)	Kings River Fan	500,000	1,500,000
	Total:	1,800,000	4,000,000

The "Minimum Storage" values for these projects were calculated based on the volumes of existing cones of depression and a conservative specific yield factor of 0.1. These storage values are currently being used in CALFED's Water Management Strategy modeling effort to make a preliminary evaluation of conjunctive use potential in the Central Valley.

The "Potential Storage" values are estimates based on raising regional water tables beyond the point of filling cones of depression, but within elevations that would not likely result in unacceptable impacts. These numbers will be revised as project specific data become available.

Project Costs: Groundwater banking costs will vary with the infrastructure required to operate the project. Some projects will utilize spreading basins, while others may use injection wells. In lieu projects, where surface water is provided so that groundwater pumping could be reduced, will also be considered. Additional infrastructure could include conveyance facilities, diversions, pump stations, filtration plants, and extraction wells.

Preliminary cost estimates for each of the projects listed above are currently being developed. In general, cost estimates for groundwater banking projects can range from $100 to $400 per acre-foot.

Timing: From a strictly technical perspective, a groundwater banking project can be designed and implemented within two to three years. However, for each of the above projects, a number of institutional and political issues will need to be addressed prior to actual implementation. Given the complexity of these issues, it will likely take at least three to five years for any of these projects to become operational.

WATER MANAGEMENT ASSETS
FOR LATE STAGE ONE IMPLEMENTATION

GROUNDWATER STORAGE SOUTH OF THE DELTA (CON'T)

Project Benefits: The primary benefit of groundwater banking is additional storage to the system. The minimum cumulative storage from the above projects is 1.8 million acre-feet. This amount of added storage will improve system flexibility and increase water supply reliability. An additional benefit will be improved groundwater basin management. Properly managed projects should not result in water quality impacts. Groundwater banking is generally environmentally neutral, and in many cases such projects can create wetland habitat and other environmental benefits.

Assumed Duration of Project Benefits: Project benefits would continue for the life of each project. With proper operation and maintenance, groundwater banking projects can continue indefinitely.

Assumed Operational Restrictions: The key operational restrictions include availability of water to be banked, recharge rates, land availability for spreading basins, and extraction rates.

Impacts on Others: Improperly managed groundwater banking projects can result in third-party impacts, including changes in water table elevations, water quality degradation, and subsidence. The Minimum Storage Groundwater Banking projects listed above would avoid many of the impacts typically associated with conjunctive use projects since they involve the filling of existing storage space in the respective groundwater basins. However, each of the above projects would require a thorough evaluation of the specific potential impacts, and development of appropriate monitoring and mutually agreeable mitigation measures. Additionally, water rights issues would need to be addressed.

Permits or Other Approvals Needed: SWRCB temporary change in place of use permits, pursuant to Water Code Section 1725, may be required. Additionally, many counties have adopted ordinances that require permits for exportation of groundwater. There is some uncertainty regarding the applicability of Water Code sections 1220 and 1011.5 with respect to some import/export groundwater banking projects.

Procedure for Obtaining Permits and Other Approvals: Developing a contract between banking partners, addressing third party impacts, applying for SWRCB and local permits, complying with CEQA/NEPA. This process could take two to three years. Clarification of Water Code sections 1220 and 1011.5 may also be needed.

Implementation Responsibility: The contracting parties.

Necessary Cooperating Parties: Contracting parties, local landowners and permitting entities.

E-021638

WATER MANAGEMENT ASSETS FOR LATE STAGE ONE IMPLEMENTATION

IN-DELTA STORAGE (WEBB TRACT AND BACON ISLAND)

Project Description:

240 TAF storage capacity
11,000 acres of reservoir
9,000 acres of habitat (Bouldin and Holland)

Reference: Delta Wetlands DEIR/EIS, December 1995

Project Costs:

$779 million estimated capital costs
$10 million estimated annual O&M costs
$236 to $328 per acre-foot

Reference: CALFED Storage and Conveyance Components, Facility Descriptions and Cost Estimates, October 1997

Timing:

DEIR/S completed December 1995, REIR/EIS in January 2000
Water rights hearing held summer 1997, continued hearing in spring 2000
2-3 year construction schedule

Project Benefits:

173-240 TAF of additional Delta exports per year
Creation of 24[illegible] TAF of new in-Delta storage
Potential salinity benefits from release of low salinity water
Elimination of 92 unscreened ag diversions
Elimination of 56 TAF of foregone ag discharges
Creation of 9,000 acres of wetland and wildlife habitat (Bouldin and Holland)

Reference: DNCT gaming EWA Game 1, Summer 1999
Delta Wetlands DEIR/EIS, December 1995

Assumed Duration of Project Benefits: Benefits are assumed to be permanent

Assumed Operational Restrictions:

4,000 cfs average monthly diversions
4,000 cfs average monthly discharges
Diversion restrictions October to March for fishery protection
Diversion prohibitions April to May for fishery protection
Discharge restrictions January to July for fishery protection

E-021639

WATER MANAGEMENT ASSETS
FOR LATE STAGE ONE IMPLEMENTATION

IN-DELTA STORAGE
(WEBB TRACT AND BACON ISLAND – CON'T)

Additional operational restrictions may be necessary to mitigate for water quality and seepage impacts

Reference: FWS and NMFS biological opinions, May 1997
DFG revised biological opinion August 1998

Impacts on Others:

Potential water quality impact on export TOC levels
Potential seepage impacts to neighboring islands
Potential salinity impacts if high salinity water is diverted to storage

[Major] Permits or Other Approvals Needed:

Water rights permit to divert and store surplus flows
404 permit to construct levee improvements
NMFS and DFG consultation for spring run chinook salmon

Procedure for Obtaining Permits and Other Approvals:

SWRCB issues water rights permit
USACE issues 404 permits
FWS, NMFS, and DFG issue biological opinions

Implementation Responsibility: Delta Wetlands or project buyer.

Necessary Cooperating Parties: DWR and USBR for operations involving SWP and CVP facilities. Fish and wildlife agencies to monitor the implementation of biological opinions

WATER MANAGEMENT ASSETS
FOR LATE STAGE ONE IMPLEMENTATION

IN-DELTA STORAGE
(BACON ISLAND CONNECTED TO EXPORT PUMPS)

Project Description:

4,000 cfs pipeline connection from Bacon to CCFB
Requires Bacon Island storage to be in place (see above)

Project Costs:

$218 million estimated capital costs (no new storage)
$1 million estimated annual O&M costs
$94 to $130 per acre-foot (in addition to Bacon storage costs, see above)

Reference: CALFED Storage and Conveyance Components, Facility Descriptions and Cost Estimates, October 1997

Timing:

Feasibility and environmental studies could take 3 to 5 years
2-3 year construction schedule

Project Benefits: 108-150 TAF of screened Delta exports per year. Reference: DNCT gaming EWA Game 1, Summer 1999

Assumed Duration of Project Benefits: Benefits are assumed to be permanent.

Assumed Operational Restrictions: 4,000 cfs capacity

Impacts on Others:

Potential impact to landowners between Bacon and CCFB
Potential impact to Santa Fe railroad
Potential impact to HWY 4
Potential impact to EBMUD aqueduct
Potential impact to gas pipeline

[Major] Permits or Other Approvals Needed:

404 permit to pipeline
Biological opinions for terrestrial and fishery species
Streambed alteration permit for siphons under channels

Procedure for Obtaining Permits and Other Approvals:

USACE issues 404 permits - FWS, NMFS, and DFG issue biological opinions

E-021641

WATER MANAGEMENT ASSETS
FOR LATE STAGE ONE IMPLEMENTATION

IN-DELTA STORAGE
(BACON ISLAND CONNECTED TO EXPORT PUMPS – CON'T)

Implementation Responsibility: Project proponent

Necessary Cooperating Parties: DWR and USBR for operations involving SWP and CVP facilities. Fish and wildlife agencies to monitor the implementation of biological opinions.

WATER MANAGEMENT ASSETS FOR LATE STAGE ONE IMPLEMENTATION

IN-DELTA STORAGE (WOODWARD ISLAND AND VICTORIA ISLAND)

Project Description:

108 TAF storage capacity (EWA gaming assumed 80 TAF)
8,300 acres of reservoir, Assume 6,800 acres of habitat

Reference: CALFED Storage and Conveyance Components, Facility Descriptions and Cost Estimates, October 1997

Project Costs:

$666 million estimated capital costs
$7 million estimated annual O&M costs
$483 to $670 per acre-foot

Reference: CALFED Storage and Conveyance Components, Facility Descriptions and Cost Estimates, October 1997

Timing:

Feasibility and environmental studies could take 3 to 5 years
Water rights hearing could be held in 2005
2-3 year construction schedule

Project Benefits:

70-97 TAF of additional Delta exports per year
Creation of 108 TAF of new in-Delta storage
Potential salinity benefits from release of low salinity water
Elimination of unscreened ag diversions
Elimination of foregone ag discharges
Creation of 6,800 acres of new wetland and wildlife habitat

Reference: DNCT gaming EWA Game 2, Summer 1999

Assumed Duration of Project Benefits: Benefits are assumed to be permanent.

Assumed Operational Restrictions:

4,000 cfs average monthly diversions
4,000 cfs average monthly discharges
Diversion restrictions October to March for fishery protection
Diversion prohibitions April to May for fishery protection
No discharge restrictions, directly connected to CCFB

E-021643

WATER MANAGEMENT ASSETS
FOR LATE STAGE ONE IMPLEMENTATION

IN-DELTA STORAGE
(WOODWARD ISLAND AND VICTORIA ISLAND – CON'T)

Impacts on Others:

Potential water quality impact on export TOC levels
Potential seepage impacts to neighboring islands
Potential salinity impacts if high salinity water is diverted to storage
Potential impact to Caltrans HWY 4
Potential impact to EBMUD aqueduct
Potential impact to gas and WAPA power transmission lines
Additional operational restrictions may be necessary to mitigate for water quality and seepage impacts

[Major] Permits or Other Approvals Needed:

Environmental evaluations (EIR/EIS)
Water rights permit to divert and store surplus flows
404 permit to construct levee improvements
Biological opinions for all species
Streambed alteration permit for siphons under channels

Procedure for Obtaining Permits and Other Approvals:

SWRCB issues water rights permit
USACE issues 404 permits
FWS, NMFS, and DFG issue biological opinions

Implementation Responsibility: Project proponent.

Necessary Cooperating Parties:

DWR and USBR for operations within SWP and CVP system
Fishery and wildlife agencies to implement biological opinions
Caltrans for HWY 4 impacts
Gas and WAPA for power transmission impacts

WATER MANAGEMENT ASSETS
FOR LATE STAGE ONE IMPLEMENTATION

IN-DELTA AGRICULTURAL DRAINAGE REDUCTION
(Source Reduction Through Treatment)

Project Description: Remove TOC from in-Delta agricultural drainage through coagulation (using alum and ferric chloride). Construction and operation of between 12 and 27 treatment plants on most of the central and south Delta islands to reduce 60% of TOC load in the discharges. Total design capacity is up to 580 MGD for a TOC removal of 73,000 lb/day. TOC removal by membrane treatment (nano-filtration and ultra-filtration) is at least twice as expensive. Bio-filtration is effective only for biodegradable organic carbon. Wetlands treatment are not effective. Source: *Candidate Delta Regions for Treatment to Reduce Organic Carbon Loads* by Marvin Jung and Quy Tran, Consultant's report to the Municipal Water Quality Investigations Program (MWQI), DWR, January 1999, and references cited therein.

Project Costs: Per treatment plant: capital cost at $4,600,000 in 1997 dollars; O&M cost is $300,000 per year plus $ 0.47 chemical cost per lb TOC removed. For 27 treatment plants with a project life of 20 years, the total cost in present worth is $420,000,000 in 1997 dollars.

Timing: 2-5 year construction schedule

Project Benefits: Monthly reductions of between 14% to 23% TOC at CCFB based on very rough estimates by DWR Delta Modeling Section using DSM2 simulations. Actual reduction might be considerably less. Averages 18% over simulation period 1976-1991. Reduction at Los Vaqueros intake is similar. Reduction at Tracy Pumping Plant is smaller and averages 10%. Source: DWR MWQI Draft Consultant report *Water Quality Benefits from Controlling Delta Island Drainage*, to appear in early 2000.

Assumed Duration of Project Benefits: Ongoing.

Assumed Operational Restrictions: Sludge disposal on dedicated land nearby is assumed. Dewatering and disposal in landfill will add about $170,000 per treatment plant annually.

Impacts: Potential increase in chloride, sulphate, sodium, calcium, and iron or aluminum concentrations in discharge due to addition of coagulants. Chloride increase could be in the range of 10 to 30 mg/L, TDS 50 to 150 mg/L.

Major Permits or Other Approvals Needed: NPDES Permits might be required.

Implementation Responsibility: DWR

Necessary Cooperating Parties: Cooperation of local land owners is critical.

E-021645

WATER MANAGEMENT ASSETS
FOR LATE STAGE ONE IMPLEMENTATION

IN-DELTA AGRICULTURAL DRAINAGE REDUCTION
(Source Reduction Through Treatment – Con't)

Other considerations: TOC modeling in the Delta has not yet advanced to a stage to be able to reliably predict TOC at intakes. In particular it is not possible at this point to quantify the success of this measure towards meeting the 3 mg/L long-term goal with confidence.

- The total capacity of drainage treatment plants considered (580 MGD) is comparable to the combined capacity of urban water treatment plants using Delta water.
- A scaled down version treating only the drainage with most impacts at intakes, possibly with seasonal operations, could be a more cost-effective approach.

WATER MANAGEMENT ASSETS FOR LATE STAGE ONE IMPLEMENTATION

SHASTA DAM EXPANSION

Project Description:. Shasta Dam is a key feature of the Central Valley Project and is an important feature in providing: a reliable source of cold water for Sacramento River fisheries; flows necessary to maintain water quality standards in the Sacramento-San Joaquin Delta; and water supplies for other consumptive uses. Expanding Shasta Dam will allow storage of surplus or wet-year water to allow greater operational flexibility and increased water supply reliability. The most feasible expansion involves raising the height of the dam 6.5 feet resulting in an increased storage capacity of 290,000 acre-feet. This low raise option maximizes storage while avoiding and/or minimizing impacts to nearby communities, recreational facilities, and the environment.

Project Costs: The estimated investment cost of a low raise is $122 million.

Timing: Technically, a low raise option expansion of Shasta Dam can be designed and implemented within six years. However, a number of institutional and political issues will need to be addressed prior to actual implementation. Given the complexity of these issues it may take longer for this project to become operational.

Project Benefits: The primary benefit of the enlargement is additional storage to the water management system. A small enlargement could increase the average annual yield between 50,000 to 125,000 acre-feet depending on hydrology. Significant benefits could be derived for: Delta water quality management, temperature control in the Sacramento River for fisheries restoration, and flood control operational flexibility.

Assumed Duration of Project Benefits: Project benefits would continue for the life of the Project. With proper operation and maintenance benefits could accrue indefinitely.

Assumed Operational Restrictions: Any new operational scenarios will have to be integrated into overall water management system operations.

Impacts on Others: While much of the new inundation zone lies within existing rights-of-way, there will be some additional adverse environmental and socioeconomic impacts on upstream landowners. There may also be positive socioeconomic impacts to some local resort owners resulting from increased water surface levels.

Permits or Other Approvals Needed: Required permits or approvals include Section 404 of the Clean Water Act, State Water Quality Certification, State Historic Preservation Act, Streambed Alteration Permits, and others as defined by State and Federal law.

Procedure for Obtaining Permits and Other Approvals: Necessary approvals and permits would be obtained through the planning and design process.

Implementation Responsibility: The U.S. Bureau of Reclamation would have implementation responsibility in coordination with other State entities and project beneficiaries.

WATER MANAGEMENT ASSETS
FOR LATE STAGE ONE IMPLEMENTATION

ASSET DESCRIPTION[1]	EXAMPLES OF HOW ASSET COULD BE APPLIED
INCREASED BANKS PUMPING CAPACITY	• Increase pumping to 8,500 cfs (mid-stage 1 asset) • Increase pumping to 10,300 cfs
EFFICIENCY INVESTMENTS	• ULFT Program: Could result in gains on the order of 120,000 af/yr mainly from implementation of state-wide program • Other ag/urban reclamation projects?
GROUNDWATER SUBSTITUTION PROJECTS (WITH ARTIFICIAL GROUNDWATER RECHARGE)	• Southern Sacramento County (near Galt): potential to fill pumping depression – at least 500,000 AF • East San Joaquin Basin: potential storage capacity up to 2,000,000 AF • Madera Ranch: approximate capacity 300,000-500,000 AF • Kings River Fan: potential storage capacity of up to 1,500,000 AF
IN DELTA STORAGE	• Potential for use of in-Delta islands
IN-DELTA AGRICULTURAL DRAINAGE REDUCTION	• Source reduction through treatment.
SHASTA DAM EXPANSION	• Raise Shasta Dam to increase storage capacity 290,000 AF

[1] A number of the summaries of potential Late Stage 1 Assets have not been completed and/or are being reevaluated for consideration. These assets include: Groundwater Storage, Blending, Shifting Refuge Water Supplies, Altering Flood Control Diagrams, and Flexing Existing Standards.

12-3-99 Draft

APPENDIX B

Potential Implementation Schedule for Most Promising Water Management Actions